

Application No. 10/523,164
Amendment Dated August 29, 2008
Reply to Office Action of April 29, 2008

REMARKS

In the Office Action dated April 29, 2008, claims 1-38 were subjected to a restriction requirement, and in view of a provisional telephone election claims 1-33 were elected with the result that in the present Office Action claims 1-33 were rejected and claims 34-38 were withdrawn from further consideration. In response, Applicant has amended claims 1, 2, 17, 18, 20, 27, 28, 32 and 33. In view of the above amendments and following remarks, reconsideration of this application is requested.

Response to Election/Restriction Requirement

In the Office Action, the Examiner subjected original claims 1-38 to a restriction/election requirement. In response, Applicant provisionally elected to prosecute the invention of Group I, i.e. claims 1-33. Applicant herein confirms this election, and further states that all of claims 1-33 read on the elected invention. Accordingly, original claims 34-38 have been withdrawn from further consideration via the present Amendment.

Amendments to Claims

Claim 1 has been amended to call for the fire resistant composition to form a self supporting ceramic under fire conditions. Claim 2 has been amended to make it clear that the glass additive referred to in claim 1 may be present as glass frit, glass fiber or mixtures thereof. The Examiner will note that each of these options is specifically demonstrated in the working examples (see Table 6 paragraphs 80 and 81). With regard to the phrase "for forming a self supporting ceramic under fire conditions" inserted into claim 1, there is basis for this phrase in paragraph 5 on page 2 of the application as filed as well as original claim 28. Therefore, no new matter has been added to the claims as amended.

Claim Objections

The Examiner has objected to the use of the terms "aromatic silane" and "aryl silane" as being equivalent species. The term "aromatic" silane is omitted from amended claim 17.

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Rejections Under 35 USC §112

Claims 32 and 33 have been amended to make it clear that the reference is to uses of the coating rather than the coating *per se*.

Claim Rejections Under 35 USC §102 and 35 USC §103

The present invention relates to polymer compositions having fire barrier properties. Under fire conditions the compositions form a ceramic residue which retains sufficient strength so that it is generally self supporting without the need for physical supports, such as tape and the like [see paragraph 5 at lines 16 to 20].

It needs to be recognized that fire barrier properties, as addressed in the present Application and which require mechanical strength at temperatures of 1000°C or more, are completely different to merely reducing flammability as described in Leroux.

The invention is based on the finding that particularly low levels of glass in an amount of from 0.3% to 8% by weight of the composition in combination with mica in an amount of 5 to 30% by weight under fire conditions provide a residual from a silicone polymer composition which has relatively good mechanical strength to provide a fire barrier even at 1050°C [see para 6 and paras 15 to 20].

It is important to recognize that the reaction between mica and glass under fire conditions is critical to the Applicant's invention [see paras 22 and 23]. As explained in line 22, the interaction of mica, (which melts above 1050°C) and glass additive forms a Eutectic at the interface between mica particles to assist in binding the particles together [see para 23]. The maximum amount of glass additive allowed is 8%, as greater amounts are reported in paragraph 24 and 25 to produce sustained shrinkage under fire conditions and cause the composition to fuse. This is also demonstrated in Example 1 [see para. 66] where 8% glass produces significant shrinkage under fire conditions. Referring to paragraph 25 of the present application Applicant teaches the importance of the upper limit of 8% glass to the performance of compositions under fire conditions.

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"In the context of this invention, fuse means that the liquid phase produced in the composition becomes a continuous phase, and/or that the mica particles largely lose their original morphology, and/or that the amount of liquid phase produced becomes sufficient to cause the ceramic to deform due to its own weight. The upper limit for the addition of the glass components is 8% by weight to avoid fusing of the composition occurring below the upper temperature of the exposure. Thus in the resulting ceramic the mica particles essentially retain their morphology, with only minor changes at the edges as a result of 'bridging' to silicon dioxide particles or 'binding' with glass particles. Hence, compositions in accordance with the present invention yield a coherent ceramic product that has substantially the same shape and volume as the composition before it was exposed to elevated temperature. Such compositions can be described as retaining near net shape." [underlining added]

Example 1 demonstrates the volume change for various ratios of silicone mica and glass frit. The column relating to firing of the composition at 1030°C (which simulates the heat under conditions of an intense fire) shows that a glass content of 10% leads to 22% reduction in volume in a composition containing 20% mica and a 45% reduction in volume for a composition with 30% mica. The Examiner will appreciate that such a significant reduction in volume will result in a fire barrier of the silicone material being seriously compromised in its function of preventing the passage of a fire through joints, panels or other building materials constructed of the silicone composition.

Example 1 and Example 2 demonstrate the synergistic interaction between glass at levels of up to 8% and mica at levels up to 30%.

The Examiner has rejected claims 1, 3-5, 7-8, 11, 16, 19 as anticipated by Leroux *et al.* as evidenced by Kerenyi and Coster.

Leroux relates to a flame resistant composition and calls for a polyorganosiloxane containing 2 to 40% hollow glass balls with an outside diameter of up to 200 µm and from 3 to 50 wt % inorganic intumescent compound.

The presence of hollow spheres of glass is required by Leroux in order to provide the flame resistance he reports. Indeed, Leroux teaches that the presence of gases in hollow spheres contributes to the flame proofing effect [see col. 2: lines 1 to 10].

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In contrast, the present invention does not require the use of hollow balls but uses the reaction between glass in specific proportions and mica to produce a ceramic of particles interconnected by glass to form a coherent self supporting product. The use of a particular type of glass for the balls is not critical to what Leroux teaches [see col. 2: lines 10 to 12] whereas the glass used in the present invention require to have a softening point below 1050°C and more preferably below 800°C.

Leroux calls for an intumescing compound.

Leroux mentions mica among a list of possible materials for use as the intumescence component although it is to be noted that Leroux expresses a strong preference for expandable graphite, in particular, in amounts from 7 to 15% by weight [col. 2: lines 53 to 66]. Indeed in the working examples, Leroux demonstrates the use of 10% expandable graphite and 15% hollow glass balls. Thus, Leroux does not recognize or teach a composition which has the interaction between glass and mica called for by the present invention. Leroux also uses a proportion of glass to intumescence compound which in the case of mica would lead to fusion of the composition under fire conditions and severe shrinkage (see above discussion) Also, Leroux does not appreciate the improvement in strength provided by the interaction between mica and glass in the compositions of the invention, or the need for the glass to have a softening temperature below 1050°C or the narrow range of glass content (0.3% to 8%) needed to provide strength without adversely affecting dimensional stability. Indeed Leroux can not have appreciated the interaction as Leroux does not provide an enabling disclosure of a mica containing composition let alone the specific proportion of glass to mica shown by the present applicants to avoid fusion of the composition and produce a synergistically improved strength [see para 67 of present application]. Clearly the present applicants have demonstrated the criticality of the composition components and ranges to achieving a stable ceramic under fire conditions and the invention as claimed in claim 1 can not accordingly be considered to be anticipated or obvious from the general disclosure of Leroux.

In Re: *Waymouth*, 499 F.2d 1273, 1276, 182 USPQ 290, 293 (CCPA 1974), the court held that unexpected results for a claimed range as compared with the range disclosed in the

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prior art had been shown by a demonstration of "a marked improvement, over the results achieved under other ratios, as to be classified as a difference in kind, rather than one of degree." Clearly this is the case here and the applicant has demonstrated the criticality of selecting mica and glass in narrow and limited proportions to avoid fusion and obtain a synergistic interaction under fire conditions. The importance of the distinction can not be viewed as merely one of degree because the loss of insulation as a result of fusion (when the glass content is above 8%) and the formation of a sturdy ceramic residue in a fire (provided by the reaction between mica and glass in the defined ranges) are the difference between rapid propagation and spread of fire and containment of a fire in situations where life and property are at risk.

Examiner refers to Kerenyi *et al.* and Coster *et al.* apparently in support of the softening temperature of glasses used in preparing a low pressure discharge lamp (Kerenyi) and the softening temperatures used in a soda-lime glass prepared by Coster *et al.* While a range of glasses is known in the art some of which have a softening temperature above 1050°C (claim 3) or above 800°C (claim 4) there is nothing in Leroux to suggest that glasses of a particular softening point are preferred or that there is any significance in this aspect. Indeed, Leroux states clearly that the use of a particular type of glass for the balls is not critical to what Leroux teaches [see col. 2: lines 10 to 12]. Softening point is therefore not germane to the flame resistance provided by hollow glass balls in the compositions of Leroux.

Clearly the skilled person is merely presented in Leroux and Crompton with alternatives applicable to different kinds of materials and in addressing problems with different types of known ingredients.

35 USC §103

The Examiner has rejected claims 2, 6, 9, 10 and 27 as obvious over Leroux in view of Crompton.

The Examiner contends that Leroux and Crompton are combinable because they are from the same field of endeavour. However, the teaching of Leroux and Crompton is not

compatible. Leroux and Crompton use glass in mutually exclusive forms; Leroux uses hollow glass balls and Crompton uses frit, which is ground glass Claims 9, 27, 12 to 24 are allowable *inter alia* due to dependence on allowable claims.

Further, the mechanisms of Leroux and Crompton are quite different with Leroux relying on a structure incorporating a gas and Crompton relying on two different melting points to exclude oxygen. Without the benefit of hindsight, the use of frits of Crompton in Leroux would be contrary to the teaching and mechanism of activation of the hollow spheres. Crompton seeks to exclude gases by forming a glaze whereas Leroux deliberately incorporates gas in hollow balls.

Leroux uses hollow glass balls to take advantage of the gas trapped and the softening temperature is not disclosed.

In contrast, Crompton uses frits of two melting points to starve the fire of oxygen [col. 2: line 66 to 68]. Leroux and Crompton therefore provide alternatives rather than complimentary options. Indeed, if the air filled balls of the Leroux *et al.* Example were used, they would counteract this objective of Crompton by incorporating oxygen containing spheres in the composition.

Further, the Examiner will note that the Crompton invention primarily addresses plastics compositions such as polyethylene, polypropylene urethane, polyesters or other plastics which are quite different from the silicone polymers of Leroux. Further, Crompton is seeking an alternative for aluminium trihydrate whereas Leroux is seeking a replacement for halogenated diphenyl compounds.

In relation to claims 28-31, it must be recognized that the prior art provides a range of options the preferred embodiments of which will clearly not provide the claimed features. Additionally, it is submitted that claims 3-5, 7-8, 11, 16, 18, 19, 21-23, 25-26 and 28-32 are dependent on claim 1 which incorporates the feature of claim 2, which was not objectionable under 35 USC 102 or 103.

The Examiner also cites several secondary references such as Cella et al '190, Hedrick, Sawada (JP 09-55125), Matsumoto et al '943, and Beauchamp '586 in combination with Leroux '454 and/or Crompton '066 for their respective teaching of specific features

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claimed in various dependent claims. However, none of these references add what is missing from Leroux '454 and/or Crompton '066, as discussed above.

An effort has been made to place this application in condition for allowance and such action is earnestly requested.

Respectfully submitted,

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